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[Vanadium in] Peru

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Recommended Citation

Miller, Benjamin LeRoy and Singewald, Joseph T. Jr., "[Vanadium in] Peru" (1916). *Early Publications of the Lehigh Faculty*. Paper 56.
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Vanadium in Peru (By Joseph T. Singewald, Jr., and Benjamin LeRoy Miller).—The vanadium production of Peru comes from the Minasragra mine which is owned and operated by the American Vanadium Co. of Pittsburg. The deposit, which contains much asphalt, had been located several times for coal, but had always been abandoned on account of its high sulphur-content, until in 1905 its vanadium-content was discovered by Antenor Rizo Patron, manager of the Hauraucaca smelter. It was then denounced by E. E. Fernandini, owner of the smelter, and Mr. Patron; and after examination for that company by D. Foster Hewett, was purchased by the American Vanadium Co. Since that time it has furnished 80 per cent. of the world's supply of vanadium, and is capable of furnishing for a long time a much larger tonnage should the demand for vanadium increase. The mine is situated in the department

of Junín, about 18 miles by trail west of the Hauraucaca smelter at an elevation of 16,500 ft.

The ore-body is a lens-shaped mass about 300 ft. long and 30 ft. wide lying along a zone of disturbance in a series of gypsiferous shales in which are intercalated a number of beds of gypsum and which have been intruded by a complicated series of igneous dikes ranging in composition from quartz porphyry to diabase. It seems to represent a replacement to a large extent at least of the shales along the zone of disturbance.

The minerals making up the ore-body are patronite, quisquite, and coke, within which are occasional nests and pockets of pyrite and a small quantity of a reddish-yellow nickeliferous iron sulphide that has been called bravoite. The quisquite is a black lustrous hydrocarbon and the coke a dull black vesicular one with a much higher carbon-content. The patronite is the vanadium mineral, and is a sulphide of vanadium with a greenish-black color carrying about 20 per cent. vanadium and over 50 per cent. sulphur. Close to the surface the vanadium sulphide has been oxidized and altered to hydrated oxides, ranging in color from red and brown to greenish black.

When the mine was first opened oxidized ores were worked yielding an ore averaging about 20 per cent. V_2O_5 . In order to increase the grade of the merchantable ore, attention is now directed to the sulphides alone, which on roasting yield a product with 40 to 50 per cent. V_2O_5 . The quisquite is not removed by roasting so that the amount of it that is present determines the maximum grade of the roasted material. The roasting plant, which was erected in 1909, consists of four hand-operated double-tier reverberatory furnaces with a capacity of 80 tons. The time consumed in passing the ore through the furnace is 2 days. In the heat of the furnace, the ore is self-burning until all but 3 per cent. of the sulphur is expelled, when coal must be added to reduce this to 0.5 per cent. The fuel is a semi-anthracite, packed on llamas from some small neighboring coal deposits.

The figures of vanadium exports from Peru as far as published in the reports on mineral production are:

	Tons.	\$.
1907.....	351.3	345,600
1908.....	1,800	629,640
1909.....	1,749	1,141,824
1910.....	3,130	1,032,000
1911.....	2,249	720,000
1912.....	3,048	None
1913.....	None	

In 1913 exportation was suspended on account of overstocking the markets in the preceding 2 or 3 years, but in 1914 and 1915 a production of the same order of magnitude as in the previous years was maintained.